

Volume 147, 1994

JOURNAL OF CATALYSIS

EDITORS

W. Nicholas Delgass, *Purdue University* Frank S. Stone, *University of Bath*

ASSOCIATE EDITOR

M. Albert Vannice, *Pennsylvania State University*

EDITORIAL BOARD

A. T. Bell
*University of California
Berkeley*

D. G. Blackmond
Merck & Co., Inc.

J. S. Bradley
Exxon Res. & Eng. Comp.

R. L. Burwell, Jr.
Northwestern University

C. T. Campbell
University of Washington

M. Che
*Université Pierre et
Marie Curie*

M. E. Davis
*California Institute of
Technology*

P. Gallezot
IRC, Villeurbanne

W. O. Haag
Mobil Res. & Dev. Corp.

W. K. Hall
University of Pittsburgh

G. L. Haller
Yale University

Y. Iwasawa
University of Tokyo

V. B. Kazansky
*Zelinsky Inst. of
Organic Chem.*

H. Knözinger
University of Munich

J. H. Lunsford
Texas A&M University

J. E. Lyons
Sun Company

G. B. McVicker
Exxon Res. & Eng. Comp.

M. Misono
University of Tokyo

F. Solymosi
Attila József University

K. C. Taylor
General Motors Res. Labs.

Henrik Topsøe
Haldor Topsøe A/S

R. A. van Santen
*Eindhoven University of
Technology*

R. S. Weber
Yale University

P. B. Wells
University of Hull

Founding Editors: J. H. de Boer and P. W. Selwood



ACADEMIC PRESS, INC.

Harcourt Brace & Company

San Diego New York Boston London Sydney Tokyo Toronto

Copyright © 1994 by Academic Press, Inc.
All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owner.

The appearance of the code at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use, or for the personal or internal use of specific clients. This consent is given on the condition, however, that the copier pay the stated, per copy fee through the Copyright Clearance Center, Inc. (222 Rosewood Drive, Danvers, Massachusetts 01923), for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. Copy fees for pre-1994 articles are as shown on the article title pages; if no fee code appears on the title page, the copy fee is the same as for current articles.

0021-9517/94 \$6.00

MADE IN THE UNITED STATES OF AMERICA

This journal is printed on acid-free paper.



CONTENTS OF VOLUME 147

Number 1, May 1994

The Influence of Sonication on the Palladium-Catalysed Dehydrogenation of Tetrahydronaphthalene	T. J. Mason, J. P. Lorimer, L. Paniwnyk, P. W. Wright, and A. R. Harris	1
<i>In Situ</i> Diffuse Reflectance FTIR Study of the Selective Catalytic Reduction of NO by NH₃ over Vanadia-Titania Aerogels	H. Schneider, S. Tschudin, M. Schneider, A. Wokaun, and A. Baiker	5
Selective Synthesis of Trialkoxysilanes by the Reaction of Metallic Silicon with Alcohols Using Copper(I) Chloride as the Catalyst	Masaki Okamoto, Ken-ichi Yamamoto, Eiichi Suzuki, and Yoshio Ono	15
CO Chemisorption and Hydrogenation of Surface Carbon Species Formed after CO/He Reaction on Rh/MgO: A Transient Kinetic Study Using FTIR and Mass Spectroscopy	A. M. Efstathiou, T. Chafik, D. Bianchi, and C. O. Bennett	24
Deuterium Tracer Study of the Conversion of Methylcyclohexane/<i>n</i>-Octane Mixtures with Pt/SiO₂ and Pt/Al₂O₃ Catalysts	Buchang Shi and Burtron H. Davis	38
Hydrogenation of But-1-yne on Platinum/Silica Catalysts: An <i>in Situ</i> Dynamic Infrared Study	Ph. Maetz, J. Saussey, J. C. Lavalley, and R. Touroude	48
Molybdenum-oxo Species Deposited on Alumina by Adsorption. III. Advances in the Mechanism of Mo^(VI) Deposition	N. Spanos and A. Lycourghiotis	57
Hydrogenation of Organic Oxygenates on Ni/Al₂O₃ and Ni/SiO₂ Catalysts	Baoshu Chen and John L. Falconer	72
Characterization of the Carbonaceous Residues on a Used Ni/SiO₂ Hydrogenation Catalyst by Temperature-Programmed Desorption Methods	Åsa Wrammerfors and Bengt Andersson	82
The Effect of Cobalt Concentration, Methanol and Ethanol on the Alcohol Synthesis over a CuZnCr Catalyst	A. Calafat and J. Laine	88
Kinetic Phase Transitions in a Three-Component NO-CO-O₂ Model for Heterogeneous Catalysis	K. Yaldram, K. M. Khan, N. Ahmed, and M. A. Khan	96
The Effect of Zn Promoter on Enhanced Diffusion during Catalytic Formation of Methylchlorosilanes	Stephen J. Potochnik and John L. Falconer	101
Rhodium-Catalyzed Adol-Type Chemistry under Syngas: Selective Reductive Dimerizations of Aldehydes to Monoaldehydes and Further Oxidation to <i>nor</i>-Ketones	Alfred F. Noels, Rino Messere, Marc Fontaine, and Albert Demonceau	107
Characterisation of Chromium Ion-Doped Titania by FTIR and XPS	A. M. Venezia, L. Palmisano, M. Schiavello, C. Martin, I. Martin, and V. Rives	115
Morphology Study of MoS₂- and WS₂-Based Hydrotreating Catalysts by High-Resolution Electron Microscopy	E. Payen, R. Hubaut, S. Kasztelan, O. Poulet, and J. Grimblot	123
Vapor-Phase Condensation of Formaldehyde and Acetaldehyde into Acrolein over Zeolites	E. Dumitriu, N. Bilba, M. Lupascu, A. Azzouz, V. Hulea, G. Cirje, and D. Nibou	133
Catalysis over Porous Anodic Alumina Catalysts	G. Patermarakis and C. Pavlidou	140

11
10/94

766HI XL
31249-150

1531



Spin Trap Study of Hydroxyl Radicals Formed in the Photocatalytic System TiO₂-Water-<i>p</i>-Cresol-Oxygen	V. Brezová and A. Staško	156
Vapour-Phase Aromatic Nitration with Dinitrogen Tetroxide over Solid Acids: Kinetics and Mechanism	A. Germain, T. Akouz, and F. Figueras	163
CO Oxidation on Substituted Copper Chromite Spinel Oxide Catalysts	K. S. R. C. Murthy and J. Ghose	171
The Conversion of Methanol and Other O-Compounds to Hydrocarbons over Zeolite β	Graham J. Hutchings, Peter Johnston, Darren F. Lee, Alistair Warwick, Craig D. Williams, and Mark Wilkinson	177
The Oxyiodination of Aromatic Compounds over Zeolite KX: The Case of Naphthalene	Gerald C. Tustin and Mark Rule	186
On the Role of Product Isomerization for Shape Selective Toluene Methylation over HZSM5	Gabriele Mirth and Johannes A. Lercher	199
Studies on the Stability of Fe³⁺ Ions in the Ferrisilicate Analog of Zeolite Beta	Anuj Raj, S. Sivasanker, and K. Lázár	207
Colloidal Rhodium: A New Catalytic System for the Reduction of Dibenzo-18-crown-6 Ether	Philippe Drogat Landré, Dominique Richard, Micheline Draye, Pierre Gallezot, and Marc Lemaire	214
IR Study of Brønsted Acidity of Al-Pillared Montmorillonite	Silvia Bodoardo, François Figueras, and Edoardo Garrone	223
Computer-Assisted Screening of Zeolite Catalysts for the Selective Isopropylation of Naphthalene	J. A. Horsley, J. D. Fellmann, E. G. Derouane, and C. M. Freeman	231
Temperature Programmed Desorption/Reaction of Ammonia over V₂O₅/TiO₂ De-NO_xing Catalysts	Luca Lietti and Pio Forzatti	241
Alkyl Chain Propagation by Methylene Insertion on Cu(100)	Jong-Liang Lin, Chao-Ming Chiang, Cynthia J. Jenks, Michael X. Yang, Tim H. Wentzlaff, and Brian E. Bent	250
Alkyl Coupling on Copper, Silver, and Gold: Correlation between the Coupling Rate and the Metal-Alkyl Bond Strength	Anumita Paul and Brian E. Bent	264
Decomposition of CH₄ over Supported Pd Catalysts	F. Solymosi, A. Erdöhelyi, J. Cserényi, and A. Felvégi	272
Transient Kinetic Study of the Reaction of C₂H₄ and C₂H₆ with the Lattice and Adsorbed Oxygen Species of Li⁺-Doped TiO₂ Catalysts	D. Papageorgiou, A. M. Efsthathiou, and X. E. Verykios	279
The Surface of Catalytically Active Spinel	Jean-Paul Jacobs, Annemarieke Maltha, John G. H. Reintjes, Jiri Drimal, Vladimir Ponec, and Hidde H. Brongersma	294
The Effect of Chloride Ions on a Li⁺-MgO Catalyst for the Oxidative Coupling of Methane	Jack H. Lunsford, Paul G. Hinson, Michael P. Rosynek, Chunlei Shi, Mingting Xu, and Xueming Yang	301
Effect of KCl Addition Method on the Pt/KL Catalyst for the Aromatization of Hexane	Lian-Xin Dai, Haru Sakashita, and Takashi Tatsumi	311
Effects of Oxygen Vacancy of Yttria-Stabilized Zirconia Support on Carbon Monoxide Oxidation over Copper Catalyst	Wei-Ping Dow and Ta-Jen Huang	322
Reactions of <i>n</i>-Hexane over Pt-Zeolite Catalysts of Different Acidity	Z. Zhan, I. Manninger, Z. Paál, and D. Barthomeuf	333

Notes

Reactions of <i>n</i> -Hexane over EUROPT-1 and Its Mechanical Mixtures with HY in Different Configurations	Zoltán Paál, Matthias R��th, Zhaoqi Zhan, and Willy Gombler	342
The Form of Hydrogen Chemisorption Isotherms on a Pt/SiO ₂ Catalyst (EUROPT-1)	Geoffrey C. Bond and Lou Hui	346
Intermolecular Cyclization of Diethanolamine and Methylamine to <i>N</i> -Methylpiperazine over Zeolites	K. Nagaiah, A. Sudhakar Rao, S. J. Kulkarni, M. Subrahmanyam, and A. V. Rama Rao	349
The Cracking of Isobutane Interpreted as a Chain Mechanism	B. W. Wojciechowski and M. M. Bassir	352
Optimum Ni Composition in Sulfided Ni–Mo Hydrodesulfurization Catalysts: Effect of the Support	J. Laine, F. Severino, and M. Labady	355
An Attempt to Distinguish between CH ₃ -Type and CH ₂ -Type Species as Chain-Extending Intermediates in the Conversion of Methanol to Gasoline over the Catalyst H-ZSM-5	Allan L. Odell, Jan M. Coddington, and Michael J. Liddell	358
Selective <i>para</i> -Chlorination of Toluene Using Zeolite Catalysts	A. P. Singh, Sujit B. Kumar, A. Paul, and Anuj Raj	360
Resolution Enhancement in the ²⁹ Si MASS NMR Spectra of High Silica ZSM-5	C. Sivadinarayana, S. Ganapathy, M. Guisnet, and V. R. Choudhary	364
Improvement of Stereospecificity of an MgCl ₂ -Supported Titanium Catalyst upon Treatment with Al(C ₂ H ₅) ₃	Mamoru Kioka, Masaaki Ohgizawa, Akira Mizuno, and Norio Kashiwa	367
Metal-Support Effects on Intramolecular Selectivity during Acetophenone Hydrogenation over Pt Catalysts	Shawn D. Lin, Diane K. Sanders, and M. Albert Vannice	370
Hydrogenation of Phenylethanol and Acetylcyclohexane over Pt	Diane K. Sanders, S.-D. Lin, and M. A. Vannice	375

Number 2, June 1994

Characterization, Activity, and Adsorption/Desorption Behavior of Alkali-Promoted Molybdate Catalysts for the Oxidative Coupling of Methane	Sharon A. Driscoll, Donna K. Gardner, and Umit S. Ozkan	379
Catalytic Cracking of a Gippsland Reduced Crude on Zeolite Catalysts	F. N. Guerzoni and J. Abbot	393
An <i>in Situ</i> Fourier Transform Infrared Study of Formic Acid Adsorption on a Polycrystalline Silver Catalyst	Graeme J. Millar, James B. Metson, Graham A. Bowmaker, and Ralph P. Cooney	404
Silica–Alumina-Supported Acidic Molybdenum Catalysts—TPR and XRD Characterization	S. Rajagopal, H. J. Marini, J. A. Marzari, and R. Miranda	417
Interaction of Nickel Deposits with Catalytic Metals on CoMo/Al ₂ O ₃ Hydrodemetallation Catalysts	Xinjin Zhao and James Wei	429
High-Pressure Oligomerization of Propene over Heteropoly Acids	J. S. Vaughan, C. T. O'Connor, and J. C. Q. Fletcher	441
Interaction of Hydrogen with Supported Ru Catalysts: High Pressure <i>in Situ</i> NMR Studies	S. Bhatia, F. Engelke, M. Pruski, B. C. Gerstein, and T. S. King	455
Changes in the Structure of TiO ₂ -Supported Molybdena Induced by Na-Doping	C. Martin, I. Martin, V. Rives, and P. Malet	465

Hydrogen Content and Hydrogenation Activity of MoS ₂ /γAl ₂ O ₃ and γAl ₂ O ₃ Mechanical Mixtures	S. Kasztelan and G. B. McGarvey	476
Synthesis and Characterization of ZSM-22 Zeolites and Their Catalytic Behavior in 1-Butene Isomerization Reactions	Mark W. Simon, Steven L. Suib, and Chi-Lin O'Young	484
Reactivity of Propene, <i>n</i> -Butene, and Isobutene in the Hydrogen Transfer Steps of <i>n</i> -Hexane Cracking over Zeolites of Different Structure	D. B. Lukyanov	494
High Surface Area Platinum-Titania Aerogels: Preparation, Structural Properties, and Hydrogenation Activity	M. Schneider, D. G. Duff, T. Mallát, M. Wildberger, and A. Baiker	500
The Role of Co in Unsupported Co-Mo Sulfides in the Hydrodesulfurization of Thiophene	Kazuhiro Inamura and Roel Prins	515
CO Disproportionation on Silica-Supported Nickel and Nickel-Copper Catalysts	M. T. Tavares, I. Alstrup, C. A. Bernardo, and J. R. Rostrup-Nielsen	525
Features of Li-Mn-MgO Catalysts and Their Relevance in the Oxidative Coupling of Methane	R. Mariscal, J. Soria, M. A. Peña, and J. L. G. Fierro	535
Conjugated Polymer-Supported Catalysts—Polyaniline Protonated with 12-Tungstophosphoric Acid	M. Hasik, W. Turek, E. Stochmal, M. Łapkowski, and A. Proń	544
A TAP Reactor Investigation of C ₆ Reforming on Nonacidic and Acidic Supported Metal Catalysts	David S. Lafyatis, Gilbert F. Froment, Anne Pasau-Claerbout, and Eric G. Derouane	552
Carbon Monoxide Oxidation over Three Different Oxidation States of Copper: Metallic Copper, Copper (I) Oxide, and Copper (II) Oxide—A Surface Science and Kinetic Study	G. G. Jernigan and G. A. Somorjai	567
Catalytic Performance and Mechanism for Oxygenated Compound Formation for Ethylene Hydroformylation over Supported Ru- <i>M</i> Bimetallic Carbonyl Cluster-Derived Catalysts	Feng-Shou Xiao and Masaru Ichikawa	578
<i>Notes</i>		
Kinetics of Carbon Monoxide Oxidation on Solid Oxide Solution and Platinum on Alumina—A Comparative Study	Sivanandi Rajadurai and J. J. Carberry	594
A Study of the Thermal Reactions of Methyl Iodide Coadsorbed with Hydrogen on Ni(111) Surfaces: Hydrogenation of Methyl Species to Methane	Sariwan Tjandra and Francisco Zaera	598
<i>Letter to the Editor</i>		
Comment on Shawn D. Lin and M. Albert Vannice on "Hydrogenation of Aromatic Hydrocarbons over Supported Pt Catalysts"	P. Tétényi	601
Author Index for Volume 147		604

NOTICE

The Subject Index for Volume 147 will appear in the December 1994 issue as part of a cumulative index for the year 1994.

JOURNAL OF CATALYSIS

INFORMATION FOR AUTHORS

The *Journal of Catalysis* publishes articles dealing with original studies in heterogeneous and homogeneous catalysis as well as studies relating catalytic properties with chemical processes at surfaces, studies of chemistry of surfaces, and engineering studies related to catalysis. All articles will be published in English.

Submission of Manuscripts. Manuscripts should be sent by registered mail to either of the Editors:

Professor W. Nicholas Delgass
c/o *Journal of Catalysis*
Editorial Office
Suite 1900
525 B Street
San Diego, California 92101-4495
Telephone: (619) 699-6469
Fax: (619) 699-6859

or

Professor Frank S. Stone
School of Chemistry
University of Bath
Bath BA2 7AY, England

Original papers only will be considered. Manuscripts are accepted for review with the understanding that the same work has not been published, that it is not under consideration for publication elsewhere, and that its submission for publication has been approved by all of the authors and by the institution where the work was carried out; further, that any person cited as a source of personal communications has approved such citation. Written authorization may be required at the Editor's discretion. Articles and any other material published in the *Journal of Catalysis* represent the opinions of the author(s) and should not be construed to reflect the opinions of the Editor(s) and the Publisher.

Authors submitting a manuscript do so on the understanding that if it is accepted for publication, copyright in the article, including the right to reproduce the article in all forms and media, shall be assigned exclusively to the Publisher. The Publisher will not refuse any reasonable request by the author for permission to reproduce any of his or her contributions to the journal.

Form of Manuscript. Manuscripts should be concise and consistent in style, spelling, and use of abbreviations. Submit manuscript (in English) in quadruplicate, including the original typewritten copy, with copies of all figures and tables. Originals of micrographs should also be submitted in quadruplicate for purposes of manuscript reviewing. All material (including tables, reference lists, etc.) should be typed double-spaced on one side of 8.5 × 11-in. white bond paper (with 1-in. margins on all sides). Each page of the manuscript should be numbered. *Page 1* should contain the article title, authors' names (without degrees), affiliations, a running title (abbreviated form of title) not exceeding 55 letters and spaces, and the name and complete mailing address (also telephone and fax numbers and e-mail

address, if possible) of the person to whom proof should be mailed. *Page 2* should contain a short abstract.

Authors should use descriptive headings in this order: Abstract, Introduction, Methods, Results, Discussion, Acknowledgments, and References.

In the Methods section, authors should draw attention to any particular chemical or biological hazards that may be involved in carrying out the experiments described. Any relevant safety precautions should be described; if an accepted code of practice has been followed, a reference to the relevant standards should be given.

If the manuscript refers to recently submitted manuscripts or papers in press (with the *Journal of Catalysis* or other journals) then please supply three copies of them so that the reviewers can judge the new manuscript in its proper context.

Revised manuscripts should be returned with one copy marked to show where changes have been made.

Notes and Letters to the Editor may not exceed 8 double-spaced typewritten manuscript pages (including tables and figures). Accepted Notes will not receive publication priority over articles.

Letters to the Editor will be considered for priority publication under the following conditions: (a) Letters must be related to some statement made in a recently published article in this Journal; (b) in cases of conflicting views on any topic, no more than one Letter from each author will be accepted.

Units of weights, measures, etc., when used in conjunction with numerals should be abbreviated and unpunctuated (e.g., 10%, 50 ml, 3 g, 8 cm).

The SI (Système International) system of units will be accepted without editorial change. Authors using other units are encouraged to define them in terms of SI units once in each publication, e.g., in an article where pressures are quoted in Torr to write "1 Torr = 133.3 N m⁻²." For information concerning SI units, see *Quantities, Units and Symbols for Physical Chemistry*, 4th ed., prepared by I. Mills and published by Blackwell Scientific, Oxford, 1988.

Footnotes should be avoided if possible; but if essential, they should be designated by superscript Arabic numerals (starting with title) in the text.

Tables should be numbered with Arabic numerals in order of mention in the text. They should be typed double-spaced on separate pages. Each table should have a short descriptive caption typed (double-spaced) above the table. Table footnotes (indicated by superscript, lowercase, italic letters) should be typed at the end of the table.

Figures should be numbered with Arabic numerals in order of mention in the text; each figure should have a descriptive legend. Legends should be typed double-spaced together on a separate page. All illustrations should be in finished form suitable for reproduction. They should be planned to fit the proportion of the printed page (7½ × 9 in.; column width, 3.5 in.). No figures should exceed 8.5 × 11 in. (21 × 27.5 cm). Lettering on drawings should be of professional quality or generated by *high-resolution* computer graphics and should be large enough

(10–12 points) to take a reduction of 50–60%. Drawings should be made with black India ink on tracing linen, smooth-surface white paper, or Bristol board. Alternatively, *high-quality* computer graphics may be acceptable. Graph paper if used should be ruled in blue. Grid lines that are to show in the final reproduction should be inked in black.

Copies of drawings are not acceptable unless they are high contrast glossy prints. All but the very simplest structures and structural formulas must be designed for direct reproduction. Illustrations in color can be accepted only if the authors defray the cost.

Electron micrographs. Please supply four photographic copies of these so that the reviewers can inspect the fine details they contain.

References to the literature should be cited in the text by Arabic numerals in parentheses, set on the text line, and listed numerically at the end of the paper. Abbreviations of journal titles should follow the style used in the latest *Chemical Abstracts' Service Source Index*. Style and punctuation of references should be in accordance with the following examples:

1. Zhang, X., Jefferson, D. A., and Lambert, R. M., *J. Catal.* **141**, 583 (1993).
2. Louis, C., and Che, M., in "Reactivity of Solids" (P. Barret and L. C. Dufour, Eds.), Vol. B, p. 1057. Elsevier, Amsterdam, 1985.
3. Pines, H., "The Chemistry of Catalytic Hydrocarbon Conversions." Academic Press, New York, 1981.

Proofs. Proofs will be sent to the author, with a reprint order form. Authors will be charged for alterations in excess of 10% of the cost of composition.

Reprints. Fifty reprints without covers will be provided free of charge. Additional reprints may be purchased; an order form will be included with proofs.

Personal Computer Disks. Manuscripts may be submitted to the *Journal of Catalysis* on personal computer disks after the manuscript has been accepted and after all revisions have been incorporated onto the disk. Please supply the file as a straight ASCII file with generic codes specified by the publisher. Label the disk with the type of computer used, the type of software and the version number, and the disk format. All tabular and mathematical material will be typeset conventionally. Art must be prepared as camera-ready copy; see the section on Figures earlier in this Information for Authors.

A hard copy printout of the manuscript that exactly matches the disk file must be supplied. Academic Press will not accept disks without accompanying printouts of all files on the disk. File names must clearly indicate the content of each file. The manuscript will be edited according to the style of the journal, and the proofs must be read carefully by the author. Disks that are not translatable or economical to process will not be used. The publisher reserves the right not to use the disk.

For further information on preparing the disk for typesetting conversion and a list of generic codes, please contact the publisher (Editorial Supervisor, Journal Division, Academic Press, 525 B Street, Suite 1900, San Diego, California 92101-4495; telephone: (619) 699-6415; fax: (619) 699-6800).

Bioorganic Chemistry

An International Journal

Editor

Gordon A. Hamilton

Pennsylvania State University
University Park

Publishing original research at the interface of chemistry and biology, **Bioorganic Chemistry** presents articles in which the principles and techniques of organic and physical organic chemistry are used in attempting to solve problems of relevance to biology or that describe chemical studies inspired by some biological observation. The emphasis is on chemical or molecular approaches to the solution of important biological problems. Regular articles, review articles, and preliminary communications are published.

Research Areas Include

- Achievement of useful organic transformations by the application of enzymes
- Application of kinetic, isotopic, stereochemical, and spectral techniques to the study of enzymes and metabolic pathways
- Characterization of the chemistry involved in new enzymatic reactions and metabolic pathways
- Chemical modifications of nucleic acids and the application of such modifications to the manipulation of genetic material
- Description of new chemistry that results from findings in biology
- Determination of the molecular mechanisms for the action of hormones and of the molecular basis of pharmacology
- Development of catalyst systems that mimic enzymes and coenzymes
- Development of mechanism-based and active site-directed inhibitors for enzymes, and characterization of the chemistry associated with their inhibition
- Elucidation of enzyme mechanisms and structure
- Elucidation of the principles involved in receptor site recognition
- Investigation of the structure and mechanism of action of pheromones and other chemical communicants
- Investigations of chemical model systems for enzymes, peptides, and other biological molecules
- Studies related to coenzyme structure and reactivity

Volume 22 (1994), 4 issues
(including annual subject index)

ISSN 0045-2068

In the U.S.A. and Canada: \$191.00

All other countries: \$223.50

Sample copies and privileged personal rates are available upon request.
For more information, please write or call:



ACADEMIC PRESS, INC.

Journal Promotion Department

525 B Street, Suite 1900

San Diego, CA 92101-4495, U.S.A.

(800) 894-3434

Journal of Colloid and Interface Science

Editor-in-Chief

Darsh T. Wasan

Illinois Institute of Technology, Chicago

Co-Editors

Arthur T. Hubbard

University of Cincinnati, Ohio

Josip P. Kratochvil

Clarkson University, Potsdam, New York

■
Publishing original research on fundamental principles and their applications, the **Journal of Colloid and Interface Science** is concerned with the work of investigators in relevant areas of chemistry, physics, engineering, biology, and applied mathematics. The journal features original research contributions from university, government, and industrial laboratories worldwide; book reviews; and letters to the editors.

Volumes 162-168 (1994), 14 issues
(including annual subject index)

ISSN 0021-9797

In the U.S.A. and Canada: \$1302.00

All other countries: \$1518.00



Sample copies and privileged personal rates are available upon request. For more information, please write or call:

ACADEMIC PRESS, INC., Journal Promotion Department

525 B Street, Suite 1900, San Diego, CA 92101-4495, U.S.A. (800) 894-3434